Mth 30, Homework 3 on sections 1.7, 2.1, 2.2

Due by Wed, Feb 26.

Please use lots of space and explain your answers, showing clearly any work you had to do. Each question is worth 3 points.

Section 1.7 Inverse Functions

(1) Let f be a function with inverse f^{-1}. Suppose $f(1) = 5$ and $f(5) = 2$.

(a) Compute $f^{-1}(5)$

(b) Compute $f^{-1}(f(5))$

(Remember that if a function sends a to b then its inverse sends b back to a. And don't get confused: here $f^{-1}(x)$ does not mean $\frac{1}{f(x)}$)

(2) **(a)** What property must a function have so that it has an inverse?

(b) Which function is the inverse of the square root function?

(3) Use the three steps we looked at in class to find the inverse of $f(x) = 2x + 3$

(Your final answer should look like $f^{-1}(x) = \dfrac{x+5}{3}$ or something similar.)

(4) Use the three steps we looked at in class to find the inverse of

$$f(x) = \frac{x-4}{5x+6}$$

(Step 1: write $y = \frac{x-4}{5x+6}$. Step 2: solve for x and to do this, begin by multiplying both sides by $5x+6$ to get $y(5x+6) = x-4$. Then distribute and move the xs to one side...)

Section 2.1 Linear Functions

(5) Let $g(x) = -7x + 13$.

(a) Is $g(x)$ a linear function?

(b) Find $g(3)$

(c) Find an x so that $g(x) = 48$

(6) A truck begins its trip 30 miles from NYC and gets 60 miles further away every hour.

(a) Write the distance of the truck from NYC as a linear function $f(t)$. Here t measures the time in hours from the starting time $t = 0$.

(b) How far is the truck from NYC after 6 hours?

(c) Is your function increasing or decreasing?

(7) A line passes through the points $(8, -2)$ and $(4, 6)$. Give the slope of this line.

(8) Write the equation of the line in the previous question. Give your answer in the form $y = mx + b$.

Section 2.2 Graphs of Linear Functions

(9) For the linear function $f(x) = \frac{1}{3}x + 2$

(a) Find the y intercept of its graph.

(b) Find the x intercept of its graph.

(c) Sketch the graph using these intercepts. Make sure to label and mark off numbers on the x and y axes.

(10) We have two lines given by the equations $x + 2y = 5$ and $2x - y = 5$.

(a) Find the slopes of each line by first writing them in the form $y = mx + b$.

(b) Are these lines parallel, perpendicular or neither?

(c) Find the coordinates of the point where the lines meet.

(11) A line ℓ_1 has equation $y = \frac{3}{2}x - 1$.

(a) Find the equation of the line ℓ_2 that is parallel to ℓ_1 and passes through the point $(6, 2)$.

(b) Find the equation of the line ℓ_3 that is perpendicular to ℓ_1 and passes through the point $(6, 2)$.

(The first step is to find the slope of the line ℓ_1. You can just read the m value. Then remember that parallel lines have the same slope...)

If you get stuck on a question or aren't sure if you understand it:

- Go over the relevant class notes or section in the textbook.
- Ask me about it after class.
- Come to my office hours: Mon 2:00 - 3:00, Wed 2:00 - 3:00 in CP 317.
- Go to the Math Tutorial Lab in-person in CP 303 or online.